

FORAGE SUITABILITY GROUP

Clayey Subsoil

FSG No.: G053CY210SD

Major Land Resource Area: 53C - Southern Dark Brown Glaciated Plains

Physiographic Features

The soils in this group are found on glacial till uplands, and on footslopes, fans, and stream terraces.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1300	2300
Slope (percent):	0	15
Flooding:		
Frequency:	None	Rare
Duration:	None	Very Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	Very high

Climatic Features

This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 53C. Average annual precipitation for all climate stations listed below is about 20 inches. About 75 percent of that occurs during the months of April through September. On average, there are about 28 days with greater than .1 inches of precipitation during the same timeframe. Annual precipitation and temperature increase from the north to the south in the MLRA. Precipitation is less than needed for optimum forage production and is the single largest factor limiting production from this group on non-irrigated lands.

Average annual snowfall ranges from 23 inches at Pickstown to 46 inches at Harrold. Snow cover at depths greater than 1 inch range from 38 days at Gettysburg to 65 days at Harrold.

Average July temperatures are about 75°F and average January temperatures are about 16°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -40 and a high of 113 both recorded at Harrold. The MLRA lies mostly in USDA Plant Hardiness Zones 4a and 4b, with a small area of warmer 5a along the Missouri River.

At Huron, the closest station with records, the average annual wind speeds are about 11.5 mph. The highest wind speeds occur during March through May. It is cloudy about 154 days a year. Average morning relative humidity in June is about 86 percent and average afternoon humidity is 59 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data, access the National Water and Climate Center at <http://www.wcc.nrcs.usda.gov>.

	From	To
Freeze-free period (28 deg)(days): (9 years in 10 at least)	122	156
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)	May 24	May 07
Last Frost in Spring (32 deg): (1 year in 10 later than)	Jun 14	May 17
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Aug 27	Sep 23
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 16	Oct 04
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	85	136
Growing Degree Days (40 deg):	4388	5543
Growing Degree Days (50 deg):	2532	3338
Annual Minimum Temperature:	-30	-15
Mean annual precipitation (inches):	17	25

Monthly precipitation (inches) and temperature (F):

2 years in 10:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. Less Than	0.10	0.13	0.55	1.00	1.21	1.40	1.26	1.02	0.46	0.47	0.15	0.19
Precip. More Than	0.62	0.83	2.36	3.48	4.20	5.55	3.95	3.29	3.60	2.43	1.49	0.94
Monthly Average:	0.40	0.55	1.38	2.23	2.88	3.25	2.74	2.21	1.78	1.37	0.70	0.55
Temp. Min.	1.3	7.5	18.2	31.1	42.2	52.3	58.2	55.5	44.9	32.8	18.9	6.1
Temp. Max.	30.1	35.8	47.6	63.8	75.1	85.3	91.1	88.7	78.0	65.5	47.0	32.9
Temp. Avg.	15.7	21.9	32.8	47.3	58.6	68.5	75.1	72.9	62.2	49.8	33.5	19.6

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
SD6574	Pickstown, SD	1961	1990
SD8767	Wagner, SD	1961	1990
SD3294	Gettysburg, SD	1961	1990
SD3608	Harrold, SD	1963	1990
SD0043	Academy, SD	1961	1990
SD6292	Onida, SD	1961	1990
SD3832	Highmore, SD	1961	1990
SD7992	Stephan, SD	1961	1990

Soil Interpretations

This group consists of deep, moderately well and well-drained, medium to moderately fine textured soils formed in glacial till or alluvium. Some of these soils are loamy on the surface but all have clayey subsoils. Permeability is moderately slow to slow. Also, some of these soils are moderately saline.

Drainage Class:	Moderately well drained	To	Well drained
Permeability Class: (0 - 40 inches)	Moderately slow	To	Slow
Frost Action Class:	Low	To	Moderate

	<u>Minimum</u>	<u>Maximum</u>
Depth:	40	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	1.0	6.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	16
Sodium Absorption Ratio: (0 - 12 inches)	0	20
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	6.1	7.8
Available Water Capacity (inches): (0 - 60 inches)	5	11

	<u>Minimum</u>	<u>Maximum</u>
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	14

Adapted Species List

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many those species can be accessed at <http://plants.usda.gov/>

Cool Season Grasses

Altai wildrye	F
Crested wheatgrass	G
Green needlegrass	G
Intermediate wheatgrass	G
Meadow brome	G
Newhy hybrid wheatgrass	G
Pubescent wheatgrass	G
Russian wildrye	G
Slender wheatgrass	G
Smooth brome	G
Tall wheatgrass	G
Western wheatgrass	G

Warm Season Grasses

Big bluestem	G
Indiangrass	F
Little bluestem	F
Sideoats grama	F
Switchgrass	G

Legumes

Alfalfa	G
Birdsfoot trefoil	F
Canada milkvetch	F
Cicer milkvetch	F
Sweetclover	G
White prairieclover	F

G - Good adaptation for forage production on this group of soils in this MLRA

F - Fair adaptation but will not produce at its highest potential

Production Estimates

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

Forage Crop

Management Intensity

	<u>High</u> (lbs/ac)	<u>Low</u> (lbs/ac)
Alfalfa	6600	3000
Alfalfa/Intermediate wheatgrass	5400	2800
Alfalfa/Smooth brome	5400	2800
Big bluestem	5100	2400
Crested wheatgrass	4600	2300
Green needlegrass	3400	1600
Intermediate wheatgrass	4900	2000
Smooth brome	4900	2000
Switchgrass	5700	2700
Western wheatgrass	3300	1300

Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

Growth Curve Number: SD0001
Growth Curve Name: Alfalfa
Growth Curve Description: Alfalfa, MLRAs 107, 102B, 63B, 66, 65

Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	30	25	20	15	5	0	0	0

Growth Curve Number: SD0004
Growth Curve Name: Cool season grass
Growth Curve Description: Cool season grass, statewide

Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	10	40	30	10	5	5	0	0	0

Growth Curve Number: SD0005
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass, statewide

Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	0	10	40	35	15	0	0	0	0

Soil Limitations

The primary limiting factors to these soils are their tight, slowly permeable nature, and moderate salinity of the subsoils of some soils. Because of their slow water intake runoff is increased causing the soils to be somewhat droughty. Water holding capacity ranges from moderate to high. Forage production on soils of moderate water holding capacity will be noticeably affected during dry growing seasons. On steeper slopes, water erosion is a potential problem during establishment when renovating stands and in thin established stands. Livestock trail erosion is a potential problem in established stands.

Management Interpretations

The impact on yields due to the tight, slowly permeable nature of these soils, and moderate salinity in some of their subsoils can be reduced by selecting species adapted to those soil conditions when establishing new stands or renovating stands. Including sod forming grass species in stands, especially on steeper slopes, will reduce the potential for sheet and rill erosion. Incorporate erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

FSG Documentation

Similar FSG's:

<u>FSG ID</u>	<u>FSG Narrative</u>
G053CY800SD	Claypan soils have elevated salinity, sodicity, and/or alkalinity and are less productive.

Inventory Data References

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas
Natural Resources Conservation Service (NRCS) National Water and Climate Center data
National Soil Survey Information System (NASIS) for soil surveys in South Dakota counties in MLRA 53C
NRCS South Dakota Technical Guide
NRCS National Range and Pasture Handbook
Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production

State Correlation

This site has been correlated with the following states: South Dakota

Forage Suitability Group Approval

Original Author: Tim Nordquist

Original Date:

Approval by: Dave Schmidt

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